

MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
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SRM Number: 1685b
MSDS Number: 1685b
SRM Name: Nitric Oxide in Nitrogen
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SECTION I. MATERIAL IDENTIFICATION

Material Name: Nitric Oxide in Nitrogen

Description: This SRM mixture is supplied in a DOT 3AL specification aluminum (6061 alloy) cylinder with a water volume of 6 L. Mixtures are shipped with a nominal pressure exceeding 12.4 MPa (1800 psi), which provides the user with 0.73 m³ (25.8 ft³) of useable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless steel valve, which is the recommended outlet for this nitric oxide mixture. NIST recommends that this cylinder not be used below 0.7 MPa (100 psi).

Other Designations: Nitric Oxide (nitrogen monoxide) in Nitrogen (dinitrogen) Gas Cylinder

Chemical Name	Chemical Formula	CAS Registry Number
Nitric Oxide	NO	10102-43-9
Nitrogen	N ₂	7727-37-9

DOT Classification: Nonflammable Gas, UN1956

Manufacturer/Supplier: Available from a number of suppliers

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Component	Nominal Concentration	Limits and Toxicity Data
Nitric Oxide	250 µmol/mol	ACGIH TLV: 25 µg/kg
		OSHA TLV-TWA (PEL): 25 µg/kg
		Rat, Inhalation LC ₅₀ : 1068 mg/m ³ /4 h
		Rat, Inhalation LC ₅₀ : 115 µg/kg
Nitrogen	balance	Simple asphyxiant

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Nitric Oxide in Nitrogen
Appearance: Colorless
Odor: Sweet odor (NO)
Physical State: Gas
Vapor Pressure: Not Applicable
Vapor Density (Air = 1): 0.968
Boiling Point: Not Applicable
Solubility in Water: 1.485 cm ³ /100 cm ³ H ₂ O
Specific Gravity (H₂O = 1): Not available
Odor Threshold: (0.27-0.9) µmol/mol

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: Nonflammable **Method Used:** Not Applicable **Autoignition Temperature:** Not Applicable

Flammability Limits in Air (Volume %): **UPPER:** Not Applicable
LOWER: Not Applicable

Extinguishing Media: Use extinguishing media that is appropriate to the surrounding fire.

Hazardous Combustion Products: Nitric oxide in contact with air emits highly toxic fumes of NO_x.

Special Fire Procedures: Fire fighters should wear full protective clothing and self-contained breathing apparatus (SCBA) when this material is involved in a fire. Keep fire cylinders cool with water spray. If possible, stop the product flow.

Unusual Fire and Explosion Hazards: Cylinders may rupture under fire conditions.

SECTION V. REACTIVITY DATA

Stability: **X** **Stable** **Unstable**

Conditions to Avoid: Storage in poorly ventilated areas. Storage near a heat source.

Incompatibility (Materials to Avoid): Reacts with organic and reducing materials. Nitrogen reacts with lithium, neodymium, and titanium at high temperatures.

See Section IV: *Fire and Explosion Hazard Data*

Hazardous Decomposition or Byproducts: In contact with air, nitric oxide forms toxic fumes of NO_x.

Hazardous Polymerization:	Will Occur	<u>X</u>	Will Not Occur
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SECTION VI. HEALTH HAZARD DATA

Route of Entry	X	Inhalation	X	Skin	Ingestion
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This material is a high pressure gas that can cause rapid suffocation. This gas may also cause eye, skin, and respiratory tract burns.

Acute Effects: The mixture can act as a simple asphyxiant by displacing air necessary for life. Nitric oxide forms acids in the lungs which are irritants that cause congestion of the throat and bronchi and edema of the lungs. Symptoms include headache, lowering of blood pressure, dizziness, development of cyanosis, and loss of consciousness. Because of its minor irritating affects on the upper respiratory tract, the warning properties are limited.

Chronic Effects: Nitric oxide may cause permanent decrements in pulmonary function.

Medical Conditions Generally Aggravated by Exposure: None known

Other Effects of Overexposure: Not Applicable

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	<u> </u>	<u>X</u>
In the International Agency for Research on Cancer (IARC) Monographs	<u> </u>	<u>X</u>
By the Occupational Safety and Health Administration (OSHA)		X

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Rinse affected area with copious amounts of water for at least 15 minutes. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance if necessary.

Inhalation: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. Lay victim with head and chest lower than hips to improve drainage of fluids from the lungs. Obtain medical assistance if necessary.

Ingestion: Not Applicable

NOTE: Signs and symptoms of pulmonary edema can be delayed for several hours.

TARGET ORGAN(S) OF ATTACK: Eyes, skin, upper respiratory tract, and mucous membranes

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoor area. Shut off source if possible and remove source of heat. In case of leakage, use SCBA. Leaks of nitric oxide are detectable by the formation of reddish-brown NO₂.

Waste Disposal: Dispose of non-refillable cylinders in accordance with federal, state, and local regulations.

Handling and Storage: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders. Wear safety shoes when handling cylinders. Use adequate general and local exhaust ventilation to maintain concentrations below exposure limits and to avoid asphyxiation. A chemical safety shower and an eyewash station must be readily available. For protection of eyes, wear safety glasses.

NOTE: Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

Store in well ventilated areas away from combustibles. Keep valve protection cap on cylinders when not in use.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Source: Scott Specialty Gases, MSDS *Nitric Oxide in Nitrogen*, 02 October 1997.

Disclaimer: Physical and chemical data contained in this MSDS are provided for use in assessing the hazardous nature of the material. The MSDS was prepared carefully using current references; however, NIST does not certify the data on the MSDS. The certified values for this material are given only on the NIST Certificate of Analysis.